5-FLUOROOROTIC ACID
Sigma Prod. No. F5013

CAS NUMBER: 703-95-7
SYNONYMS: ENT 26398; 5-Fluoroorotate; Fluoroorotic Acid; NSC 31712; FOA; 4-Pyrimidinecarboxylic Acid, 5-Fluoro-1,2,3,6-Tetrahydro-2,6-Dioxo-(9CI); RO 2-9945; 1,2,3,6-Tetrahydro-2,6-Dioxo-5-Fluoro-4-Pyrimidinecarboxylic Acid¹; WR -152520²; 5-Fluoro-6-Carboxyuracil²

PHYSICAL DESCRIPTION:
Appearance: White to white with a yellow cast powder.³
Melting Point: approx. 256-259°C⁴
Molecular Formula: C₅H₅FN₂O₄
Molecular Weight: 174.1

METHOD OF PREPARATION:
FOA is synthetically prepared⁵. Methods for the synthetic preparation and the mass spectra have been reported.⁴,⁶,⁷

STABILITY / STORAGE AS SUPPLIED:
FOA is stable for at least one year when stored desiccated at -20°C.³

SOLUTION / SOLUTION STABILITY:
FOA has been dissolved at about 50 mg/ml in 4 M ammonium hydroxide producing a clear solution (sonication or heat may be needed).³ The monohydrate is partially soluble in water.² A concentration of 0.05 mg/ml of FOA was added to a tryptone medium for incubation of cultures at 80°C for four days with apparently no adverse effects to the FOA.⁸

USAGE / APPLICATIONS:
FOA (1 mg/ml) has been used as a selective agent in yeast molecular genetics⁹; in the selection of Ura⁻ cells in a population of Ura⁺ cells; and in the selection of orotidine-5-phosphate decarboxylase (OMPdecase) mutants of Saccharomyces cerevisiae.¹⁰-¹² FOA (0.1 mg/ml) has been used in the positive selection for uracil auxotrophs of the sulfur-dependent thermophilic archae bacterium Sulfolobus acidocaldarius⁸.
USAge / ApPLICAtIONS: (continued)

The selection of OMPdecase-deficient and orotate phosphoribosyl transferase (OPRTase)-deficient mutants in the Mucor fungus using FOA was reported. The ability of catalytic antibodies to produce 5-fluorouracil from FOA was assessed in a bacterial strain. FOA inhibited the synthesis of mature cytoplasm ribosomal RNA in rat liver cells. FOA is a noncompetitive inhibitor of dihydroorotase. FOA (50% inhibition, 6 nM) was a selective inhibitor of malarial cells of Plasmodium falciparum in vitro and in vivo. Inhibition is possibly due to the binding of the FOA metabolite, 5-fluoro-2'-deoxyuridylate to the Plasmodium thymidylate synthase. FOA showed anti-tumor activity against transplanted tumors in rats and mice; a bacteriostatic effect in vitro against various microorganisms, particularly gram-negative bacteria; antimycotic activity against various types of mold.

GENErAL NOTES:

FOA is a derivative of a pyrimidine precursor and is selectively toxic to yeast cells which synthesize orotidine-5'-phosphate decarboxylase. FOA has been used in a positive selection for uracil-requiring mutants (in the presence of large numbers of wild-type cells) lacking OMPdecase or OPRTase activities. This results in efficient strains for effective transformation systems.

REFERENCES:

1. Material Safety Data Sheet.
2. The Merck Index, 12th ed. #4214, p. 708.
3. Sigma Quality Control data.
5. Supplier data.